UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/054,652	01/18/2002	Thomas B. Pritchard	10016350 - 1	9419

7590 12/29/2005

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER	
MILIA, MARK R	
ART UNIT	**PAPER NUMBER**
2622	

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/054,652	PRITCHARD, THOMAS B.	
	Examiner	Art Unit	
	Mark R. Milia	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 1/18/02
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-7 and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Application Publication No. 2002/0122210 to Mitchell Ilbery.

Regarding claim 1, Ilbery discloses a method, comprising: partitioning a group of pixels, corresponding to a group of values, into a plurality of segments, with each of the segments including a plurality of rows of the pixels (see Figs. 3 and 8, and paragraphs 17, 63, and 167, reference shows in figure 8 that pixels are grouped in rows and columns which is analogous to the claim limitation), halftoning a first plurality of values, corresponding to a first one of the plurality of rows in a first one of the plurality of segments, to form a first plurality of error terms (see paragraphs 18, 19, 57, and 64, reference states that halftoning is executed pixel by pixel, row by row, the values of which are stored in a line buffer), and halftoning, using at least one of the first plurality of error terms, on a second plurality of values corresponding to a second one of the

plurality of rows in a second one of the plurality of segments, after completion of the halftoning on the first plurality of values, to form a second plurality of error terms (see paragraphs 18-22, 57-59, 149, 167, 169-170, and 214, reference states that halftoning is executed pixel by pixel, row by row, the values of which are stored in a line buffer and the error terms are diffused into unprocessed pixels located in a subsequent row that will then also undergo halftoning, all of which is analogous to the claim limitation).

Regarding claim 31, Ilbery discloses a halftoning apparatus, comprising: first means for halftoning on a first set of values corresponding to a first set of pixels (see Figs. 8-9 and paragraphs 165, 167, 169-170, 493 lines 1-6, and 495 lines 1-2), second means for halftoning on a second set of values corresponding to a second set of pixels, with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see Figs. 8-9 and paragraphs 163-194), and means for transferring arranged to transfer a third set of values, from the halftoning of ones of the first set of values corresponding to the ones of the first set of pixels, to the second means for halftoning and for transferring a fourth set of values, from the halftoning of ones of second set of values corresponding to the ones of the second set of pixels, to the first means for halftoning (see Fig. 9 and paragraphs 163-194, reference shows that a current scanline error buffer distributes error values to a next scanline error buffer that will then be utilized in the processing of the next scanline, thereby transferring values corresponding to sets of pixels, reference also states that halftoning is executed pixel by pixel, row by row, the values of which are stored in a line buffer and the error terms are diffused into unprocessed pixels located in

a subsequent row that will then also undergo halftoning, all of which is analogous to the claim limitation).

Regarding claim 2, Ilbery discloses the method discussed in claim 1, and further discloses wherein the first one of the plurality of segments and the second one of the plurality of segments include equal numbers of the pixels (see Figs. 3 and 8 and paragraphs 149 and 167, reference shows in figure 8 that each column has the same number of pixels and each row has the same number of pixels).

Regarding claim 3, Ilbery discloses the method discussed in claim 2, and further discloses wherein the first one of the plurality of segments exists adjacent to the second one of the plurality of segments within an image formed by the plurality of segments (see Fig. 8, reference shows columns labeled –6 through 6 being adjacent to each other and each representing a segment) and a boundary at an interface between the first one of the plurality of segments and the second one of the plurality of segments forms a substantially straight line within the image (see Fig. 8 and paragraph 167, reference shows that each pixel as a unique coordinate value, known as a mask position value, therefore each column creates a boundary between segments of pixels, it can also be seen that boundaries exist between rows as well).

Regarding claim 4, Ilbery discloses the method discussed in claim 3, and further discloses wherein the boundary exists substantially perpendicular to the plurality of rows of the pixels (see Figs. 3 and 8 and paragraph 167, reference shows mask position columns the create a boundary between segments/columns of pixels).

Regarding claim 5, Ilbery discloses the method discussed in claim 4, and further discloses wherein the first one of the plurality of rows and the second one of the plurality of rows exist in alignment within the image (see Figs. 3 and 8).

Regarding claim 6, Ilbery discloses the method discussed in claim 5, and further discloses wherein the halftoning includes error diffusion halftoning (see paragraphs 17-19 and 160).

Regarding claim 7, Ilbery discloses the method discussed in claim 6, and further discloses wherein halftoning of ones of the plurality of rows in the first one of the plurality of segments, other than the first one of the plurality of rows, occurs contemporaneously with halftoning of ones of the plurality of rows in the second one of the plurality of segments, other than the second one of the plurality of rows (see Figs. 3 and 8 and paragraphs 149 and 167-170).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 9-24, 27-28, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ilbery.

Regarding claim 9, Ilbery discloses an apparatus, comprising: a processing device to perform halftoning on a first set of values corresponding to a first set of pixels (see Figs. 8-9 and paragraphs 165, 167, 169-170, 493 lines 1-6, and 495 lines 1-2), a processing device to perform halftoning on a second set of values corresponding to a second set of pixels, with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see Figs. 8-9 and paragraphs 163-194), and a bus arranged for transferring a third set of values, from the halftoning of ones of the first set of values corresponding to the ones of the first set of pixels, to the second processing device and for transferring a fourth set of values, from the halftoning of ones of second set of values corresponding to the ones of the second set of pixels, to the first processing device (see Fig. 9 and paragraphs 163-194, reference shows that a current scanline error buffer distributes error values to a next scanline error buffer that will then be utilized in the processing of the next scanline, thereby transferring values corresponding to sets of pixels, reference also states that halftoning is executed pixel by pixel, row by row, the values of which are stored in a line buffer and the error terms are diffused into unprocessed pixels located in a subsequent row that will then also undergo halftoning, all of which is analogous to the claim limitation).

Ilbery does not disclose expressly a first processing device and a second processing device.

However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have one or more processing devices to perform halftoning on

a set of values corresponding to a set of pixels because it is well known in the art to modularize processes or processing devices to better perform a certain function, have a particular arrangement, etc.

Regarding claim 27, Ilbery discloses an imaging device, comprising: an interface arranged to receive data, corresponding to an image, from a computer (see Fig. 21), a processor configured to generate color values, corresponding to pixels forming the image, using the data received from the interface (see Fig. 21 and paragraphs 4-10), a processing system arranged to receive the color values and including a processing device to perform halftoning on a first set of values, included in the color values, corresponding to a first set of pixels included in the pixels forming the image to form a first set of halftone values (see Figs. 8-9 and paragraphs 165, 167, 169-170, 493 lines 1-6, and 495 lines 1-2), a processing device to perform halftoning on a second set of values, included in the color values, corresponding to a second set of pixels included in the pixels forming the image to form a second set of halftone values (see Figs. 8-9 and paragraphs 163-194), with ones of the first set of pixels located adjacent to the second set of pixels and with ones of the second set of pixels located adjacent to the first set of pixels (see Figs. 8-9 and paragraphs 163-194) and a bus coupling the first processing device and the second processing device for transferring a third set of values from the halftoning of the ones of the first set of pixels to the second processing device and for transferring a fourth set of values from the halftoning of the ones of the second set of pixels to the first processing device (see Fig. 9 and paragraphs 163-194, reference shows that a current scanline error buffer distributes error values to a next scanline

error buffer that will then be utilized in the processing of the next scanline, thereby transferring values corresponding to sets of pixels, reference also states that halftoning is executed pixel by pixel, row by row, the values of which are stored in a line buffer and the error terms are diffused into unprocessed pixels located in a subsequent row that will then also undergo halftoning, all of which is analogous to the claim limitation), an image forming mechanism configured to form the image using the first set of halftone values and the second set of halftone values (see Fig. 21 "2115"), and memory to store the color values, the first set of halftone values, and the second set of halftone values (see Fig. 21).

Ilbery does not disclose expressly a first processing device and a second processing device.

However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have one or more processing devices to perform halftoning on a set of values corresponding to a set of pixels because it is well known in the art to modularize processes or processing devices to better perform a certain function, have a particular arrangement, etc.

Regarding claims 10 and 18, Ilbery further discloses wherein the halftoning includes error diffusion halftoning (see paragraphs 17-19 and 160).

Regarding claim 11, Ilbery further discloses wherein the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first set of pixels (see Fig. 9 and paragraphs 163-194), and the fourth set of values includes

error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Fig. 9 and paragraphs 163-194).

Regarding claim 12, Ilbery further discloses wherein the first set of pixels and the second set of pixels each include equal numbers of the pixels, with the first set of pixels and the second set of pixels included within an image (see Figs. 8 and 17 and paragraphs 5, 8-10, 17-19, and 149), and with the ones of the first set of pixels adjacent to the ones of the second set of pixels within the image (see Fig. 8).

Regarding claim 13, Ilbery further discloses wherein a boundary at an interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Fig. 8 and paragraph 167, reference shows that each pixel as a unique coordinate value, known as a mask position value, therefore each column creates a boundary between segments of pixels, it can also be seen that boundaries exist between rows as well).

Regarding claim 14, Ilbery further discloses wherein the first set of pixels includes a spatial arrangement into a first plurality of rows forming a first segment of the image (see Fig. 8 and paragraph 167) and the second set of pixels includes a spatial arrangement into a second plurality of rows forming a second segment of the image, with the ones of the first set of pixels forming a first column adjacent to a second column formed from the ones of the second set of pixels, with the boundary at the interface between the first column and the second column (see Fig. 8).

Regarding claim 15, Ilbery discloses wherein the first plurality of rows includes a first row located on a first edge of the first segment and the second plurality of rows

includes a second row located on a second edge of the second segment, with the first row aligned with the second row in the image (see Fig. 8) and the first processing device includes a configuration to complete the error diffusion halftoning on the first row before the second processing device begins the error diffusion halftoning on the second row (see Fig. 9 and paragraphs 169-170).

Regarding claim 16, Ilbery further discloses wherein the first plurality of rows includes a third row located adjacent to the first row in the first segment (see Fig. 8 and paragraph 167), the second plurality of rows includes a fourth row located adjacent to the second row in the second segment (see Fig. 8 and paragraph 167), the second processing device includes a configuration to begin the error diffusion halftoning on the second row before the first processing device completes the error diffusion halftoning on the third row (see Fig. 9 and paragraphs 169-170), and the first processing device includes a configuration to complete the error diffusion halftoning on the third row before the second processing device begins the error diffusion halftoning on the fourth row (see Fig. 9 and paragraphs 169-170, reference shows that error diffusion halftoning is performed pixel by pixel and row by row).

Regarding claim 17, Ilbery further discloses wherein the processing device includes a halftone processor (see Fig. 9 and paragraphs 169-170).

Ilbery does not disclose expressly a first processing device and a second processing device.

However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have one or more processing devices to perform halftoning on

a set of values corresponding to a set of pixels because it is well known in the art to modularize processes or processing devices to better perform a certain function, have a particular arrangement, etc.

Regarding claim 19, Ilbery further discloses a processing device to perform halftoning on a fifth set of values corresponding to a third set of pixels (see Figs. 8 and 9 and paragraphs 167-170), and a processing device to perform halftoning on a sixth set of values corresponding to a fourth set of pixels, with ones of the third set of pixels located adjacent to the fourth set of pixels, with ones of the fourth set of pixels located adjacent to the third set of pixels, and with the bus coupled to the third processing device and the fourth processing device for transferring a seventh set of values, from the halftoning of the ones of the third set of pixels to the fourth processing device, and for transferring an eighth set of values, from the halftoning of the ones of the fourth set of pixels, to the third processing device (see Figs. 8 and 9 and paragraphs 167-170, reference shows that a current scanline error buffer distributes error values to a next scanline error buffer that will then be utilized in the processing of the next scanline, thereby transferring values corresponding to sets of pixels, reference also states that halftoning is executed pixel by pixel, row by row, the values of which are stored in a line buffer and the error terms are diffused into unprocessed pixels located in a subsequent row that will then also undergo halftoning, all of which is analogous to the claim limitation).

Regarding claim 20, Ilbery further discloses wherein the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first

set of pixels (see Figs. 8 and 9 and paragraphs 169-170), the fourth set of values includes error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Figs. 8 and 9 and paragraphs 169-170), the seventh set of values includes error terms generated from the error diffusion halftoning of the ones of the third set of pixels (see Figs. 8 and 9 and paragraphs 169-170), and the eighth set of values includes error terms generated from the error diffusion halftoning of the ones of the fourth set of pixels (see Figs. 8 and 9 and paragraphs 169-170).

Regarding claim 21, Ilbery further discloses wherein the first set of pixels, the second set of pixels, the third set of pixels, and the fourth set of pixels each include equal numbers of pixels, with the first set of pixels, the second set of pixels, the third set of pixels, and the fourth set of pixels included within an image (see Fig. 8 and paragraph 165).

Regarding claim 22, Ilbery further discloses wherein a first boundary formed at a first interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Fig. 8 and paragraph 167) and a second boundary formed at a second interface between the ones of the third set of pixels and the ones of the fourth set of pixels forms the substantially straight line within the image (see Fig. 8 and paragraph 167).

Regarding claim 23, Ilbery further discloses wherein the first set of pixels includes a spatial arrangement into a first plurality of rows forming a first segment (see Fig. 8 and paragraph 167), the second set of pixels includes a spatial arrangement into a second plurality of rows forming a second segment, with the ones of the first set of

pixels forming a first column adjacent to a second column formed from the ones of the second set of pixels, with the first boundary at the interface between the first column and the second column (see Fig. 8), the third set of pixels includes a spatial arrangement into a third plurality of rows forming a third segment (see Fig. 8 and paragraph 167), and the fourth set of pixels includes a spatial arrangement into a fourth plurality of rows forming a fourth segment, with the ones of the third set of pixels forming a third column adjacent to a fourth column formed from the ones of the fourth set of pixels, with the second boundary at the interface between the third column and the fourth column (see Fig. 8).

Regarding claim 24, Ilbery further discloses wherein the first plurality of rows includes a first row located on a first edge of the first segment, the second plurality of rows includes a second row located on a second edge of the second segment, the third plurality of rows includes a third row located on a third edge of the third segment, the fourth plurality of rows includes a fourth row located on a fourth edge of the fourth segment, with the first row, the second row, the second row, the third row, and the fourth row aligned within the image (see Fig. 8), the first processing device includes a configuration to complete the error diffusion halftoning on the first row before the processing device begins the error diffusion halftoning on the second row (see Fig. 9 and paragraphs 169-170), the processing device includes a configuration to complete the error diffusion halftoning on the second row before the processing device begins the error diffusion halftoning on the third row (see Fig. 9 and paragraphs 169-170), and the processing device includes a configuration to complete the error diffusion halftoning on

the third row before the processing device begins the error diffusion halftoning on the fourth row (see Fig. 9 and paragraphs 169-170).

Regarding claim 25, Ilbery further discloses wherein the first set of pixels includes a third set of pixels and the second set of pixels includes the third set of pixels, with the ones of the first set of pixels located adjacent to the third set of pixels and the ones of the second set of pixels located adjacent to the third set of pixels (see Fig. 8, reference shows error mask position values that make up a plurality of columns, therefore it would be obvious to group pixels in a number of different ways, for example, having a pixel set that contains columns –6 through 0 and pixel set that contains columns 1 through 6, all of which does not effect the ultimate outcome, error diffusion halftoning which is obtained by a halftone process performed pixel by pixel, row by row).

Regarding claim 26, Ilbery further discloses wherein the processing device includes a configuration to transfer a fifth set of values, corresponding to a first subset of pixels of the third set of pixels included within the first set of pixels, to the second processing device using the bus (see Fig. 9 and paragraphs 163-194), the processing device includes a configuration to transfer a sixth set of values, corresponding to a second subset of pixels of third set of pixels included within the second set of pixels, to the first processing device using the bus (see Fig. 9 and paragraphs 163-194), the processing device includes a configuration to perform the error diffusion halftoning on the sixth set of values (see Fig. 9 and paragraphs 167-170), and the processing device includes a configuration to perform the error diffusion halftoning on the fifth set of values (see Fig. 9 and paragraphs 167-170).

Regarding claim 28, Ilbery further discloses wherein the halftoning includes error diffusion halftoning (see paragraphs 17-19 and 160), the third set of values includes error terms generated from the error diffusion halftoning of the ones of the first set of pixels (see Fig. 9 and paragraphs 163-194), the fourth set of values includes error terms generated from the error diffusion halftoning of the ones of the second set of pixels (see Fig. 9 and paragraphs 163-194), the first set of pixels and the second set of pixels each include equal numbers of the pixels, with the first set of pixels and the second set of pixels and with the ones of the first set of pixels adjacent to the ones of the second set of pixels within the image (see Figs. 3 and 8 and paragraphs 149 and 167, reference shows in figure 8 that each column has the same number of pixels and each row has the same number of pixels, reference shows columns labeled –6 through 6 being adjacent to each other and each representing a segment), and a boundary at an interface between the ones of the first set of pixels and the ones of the second set of pixels forms a substantially straight line within the image (see Fig. 8 and paragraph 167, reference shows that each pixel as a unique coordinate value, known as a mask position value, therefore each column creates a boundary between segments of pixels, it can also be seen that boundaries exist between rows as well).

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ilbery as applied to claim 1 above.

Ilbery discloses a first plurality of segments and a second plurality of segments (see Fig. 8).

Ilbery does not disclose expressly wherein the first one of the plurality of segments includes ones of the pixels included in the second one of the plurality of segments.

However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to include pixels included in the second one of the plurality of segments in the first one of the plurality of segments because reference shows error mask position values that make up a plurality of columns, therefore it would be obvious to group pixels in a number of different ways, for example, having a pixel set that contains columns –6 through 0 and pixel set that contains columns 1 through 6, all of which does not effect the ultimate outcome, error diffusion halftoning which is obtained by a halftone process performed pixel by pixel, row by row.

6. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6870642 to Ostromoukhov.

Ostromoukhov discloses an inkjet printer for forming an image on media using ink, comprising: a first printhead positioned to eject the ink onto the media for a first portion of the image (see Fig. 5 and column 7 lines 6-18), a first printhead driver configured to generate a first set of electrical signals, used by the first printhead for the ejection of the ink, from a first set of halftone values (see Figs. 5 "34" and 6 and column 7 lines 1-5 and 19-51), a first halftone processor configured to perform error diffusion halftoning on a first set of values corresponding to a first set of pixels included in the first portion of the image to form the first set of halftone values (see Fig. 5 and column 6

lines 37-67), a first memory to store the first set of values and the first set of halftone values (see Fig. 5 "37" and column 6 line 56-column 7 line 3), a first memory controller configured to transfer the first set of values and the first set of halftone values to and from the first memory and the first halftone processor (see Fig. 5 and column 6 line 37-column 7 line 18), a first processor coupled to the first memory controller and the first halftone processor (see Fig. 5 "34" and "40"), and a bus arranged to transfer error terms from performing the error diffusion halftoning between the first processor and the second processor, between the second processor and the third processor, and the third processor and the fourth processor (see Fig. 5).

Ostromoukhov does not disclose expressly a second printhead positioned to eject the ink onto the media for a second portion of the image; a second printhead driver configured to generate a second set of electrical signals, used by the second printhead for the ejection of the ink, from a second set of halftone values; a second halftone processor configured to perform error diffusion halftoning on a second set of values corresponding to a second set of pixels included in the second portion of the image to form the second set of halftone values; a second memory to store the second set of values and the second set of halftone values; a second memory controller configured to transfer the second set of values and the second set of halftone values to and from the second memory and the second halftone processor; a second processor coupled to the second memory controller and the second halftone processor; a third printhead positioned to eject the ink onto the media for a third portion of the image; a third printhead driver configured to generate a third set of electrical signals, used by the third

printhead for the ejection of the ink, from a third set o' halftone values; a third halftone processor configured to perform error diffusion halftoning on a third set of values corresponding to a third set of pixels included in the third portion of the image to form the third set of halftone values; a third memory to store the third set of values and the third set of halftone values; a third memory controller configured to transfer the third set of values and the third set of halftone values to and from the third memory and the third halftone processor; a third processor coupled to the third memory controller and the third halftone processor; a fourth printhead positioned to eject the ink onto the media for a fourth portion of the image; a fourth printhead driver configured to generate a fourth set of electrical signals, used by the fourth printhead for the ejection of the ink, from a fourth set of halftone values; a fourth halftone processor configured to perform error diffusion halftoning on a fourth set of values corresponding to a fourth set of pixels included in the fourth portion of the image to form the fourth set of halftone values; a fourth memory to store the fourth set of values and the fourth set of halftone values; a fourth memory controller configured to transfer the fourth set of values and the fourth set of halftone values lo and from the fourth memory and the fourth halftone processor; and a fourth processor coupled to the fourth memory controller and the fourth halftone processor.

However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to have four printheads, printhead drivers, halftone processors, memory, memory controllers, and processors, one for each of the different colored inks (CMYK), to perform halftoning on a set of values corresponding to a set of pixels

because it is well known in the art to modularize processes or processing devices to better perform a certain function, have a particular arrangement, etc. Further, the invention described by the reference of Ostromoukhov ultimately serves the same purpose and function as that of the current claim limitations and therefore would have been obvious.

7. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ostromoukhov as applied to claim 29 above, and further in view of Ilbery.

Ostromoukhov does not disclose expressly the first set of pixels and the second set of pixels include common ones of the pixels, the second set pixels and the third set of the pixels include common ones of the pixels, and the third set of pixels and the fourth set of the pixels include common ones of the pixels.

Ilbery discloses the first set of pixels and the second set of pixels include common ones of the pixels (see Fig. 8), the second set pixels and the third set of the pixels include common ones of the pixels (see Fig. 8), and the third set of pixels and the fourth set of the pixels include common ones of the pixels (see Fig. 8).

Ostromoukhov & Ilbery are combinable because they are from the same field of endeavor, halftoning by error diffusion.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine the arrangement of pixels as described by Ilbery with the system of Ostromoukhov.

The suggestion/motivation for doing so would have been to reduce the number of worm artifacts (see paragraphs 29-60 of Ilbery).

Therefore, it would have been obvious to combine Ilbery with Ostromoukhov to obtain the invention as specified in claim 30.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. To further show the state of the art refer to the attached Notice of References Cited.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark R. Milia whose telephone number is (571) 272-7408. The examiner can normally be reached M-F 8:00am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Coles can be reached at (571) 272-7402. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark R. Milia
Examiner
Art Unit 2622

MRM

...INER
... 2600